DOCUMENT RESUME

ED 097 584 CE 002 404

TITLE	Aircraft Assembly, Riveting and Surface Repair 2; Sheet Metal Work 2: 9855.03.
INSTITUTION	Dade County Public Schools, Miami, Fla.
PUB DATE	Feb 74
NOTE	18p.; An Authorized Course of Instruction for the Quinmester Program
EDRS PRICE	MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS	*Assembly (Manufacturing); Course Content; Course Objectives; *Curriculum Guides; Job Skills; Metallurgy; *Metal Working Occupations; Post Secondary Education; Repair; Secondary Grades; Sheet Metal Work; *Trade and Industrial Education
IDENTIFIERS	Aircraft; *Quinmester Program

ABSTRACT

This course provides experience in assembly techniques, including repairs on aircraft structures, utilizing all methods from basic layout to surface protection of finished parts. Course content includes goals, specific objectives, metal fasteners, general structural repairs, and aircraft assembly. A bibliography and post-test are appended. Prior to taking this course the student must display mastery of the skills indicated in "Aircraft Assembly, Riveting and Surface Repair 1". (NH)

AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Course Outline

SHEET METAL WORK 2 - 9855
(Aircraft Assembly, Riveting and Surface Repair 2)

Department 48 - Quin 9855.03

ED 092407

DADE COUNTY PUBLIC SCHOOLS
DIVISION OF INSTRUCTION • 1974

D A D E C O U N T Y P U B L I C S C H O O L S
1450 NORTHEAST SECOND AVENUE
MIAMI, FLORIDA 33132

BEST COPY AVAILABLE

Course Outline

SHEET METAL WORK 2 - 9855
(Aircraft Assembly, Riveting and Surface Repair 2)

Department 48 - Quin 9855.03

county office of
VOCATIONAL AND ADULT EDUCATION

THE SCHOOL BOARD OF DADE COUNTY

Mr. G. Holmes Braddock, Chairman
Mr. William H. Turner, Vice-Chairman
Mrs. Ethel Beckham
Mr. Alfredo G. Duran
Mrs. Phyllis Miller
Mr. Robert Renick
Dr. Ben Sheppard

Dr. E. L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

February, 1974

Published by the School Board of Dade County

Course Description

9855	48	9855.03	Aircraft Assembly, Riveting and Surface Repair 2
State Category Number	County Dept. Number	County Course Number	Course Title

This is an advanced quin course in assembly technique including repairs on aircraft structures, utilizing all methods from basic layout to surface protection of finished parts. This is a three quinmester credit course.

Indicators of success: Prior to entry into this course the student must display mastery of the skills indicated in Aircraft Assembly, Riveting and Surface Repair 1 (9855.02).

Clock Hours: 135

PREFACE

The following course outline is a third quinmester course.

Prior to entry into this course, the vocational student must display mastery of the skills indicated in Aircraft Assembly, Riveting and Surface Repair 1 (9855.02). This course outline serves as a guide to the instructor who teaches in the field of sheet metal.

This advanced course is composed of four blocks of instruction, which are subdivided into several units each. It is 135 hours in length.

Emphasis is placed on the use of visual aids, mock-ups, cutaways, transparencies, films, various instructional sheets and manipulative shop practice.

Upon completion of this course, the student will have a general overall basic understanding of aircraft structure, aircraft riveting, surface repairs, and surface protection of metal.

This outline was developed through the cooperative efforts of the instructional and supervisory personnel, the Quinmester Advisory Committee and the Vocational Curriculum Materials Service, and has been approved by the Dade County Vocational Curriculum Committee.

TABLE OF CONTENTS
With Suggested Hourly Breakdown

	Page
PREFACE	i
GOALS	iii
SPECIFIC BLOCK OBJECTIVES	iv
BIBLIOGRAPHY	3
BLOCK	
I. METAL FASTENERS (24 Hours)	
Riveting	1
Installing Rivets	1
II. GENERAL STRUCTURAL REPAIRS (84 Hours)	
Making Structural Repairs	1
Making Repairs to Flight Controls	1
III. AIRCRAFT ASSEMBLY (27 Hours)	
Checking Alignment of Structures	1
Reading Stations' Diagrams	1
Using Manufacturer's Manuals	2
IV. QUINMESTER POSTTEST	
APPENDIX: QUINMESTER POSTTEST SAMPLE	7

GOALS

The student must be able to demonstrate:

1. The ability needed to do aircraft structural repairs.
2. The ability to check, align and assemble aircraft sections.
3. The ability to perform proper riveting on aircraft sections and structural parts.
4. The ability to assume the responsibility inherent in the aviation sheet metal technician's occupation.

SPECIFIC BLOCK OBJECTIVES

BLOCK I - METAL FASTENERS

The student must be able to:

1. Demonstrate the proper methods of drilling holes for riveting.
2. Exhibit the ability to prepare the metal before riveting.
3. Demonstrate the proper use of hand and power tools for riveting.
4. Explain the standards for acceptable rivets.

BLOCK II - GENERAL STRUCTURAL REPAIRS

The student must be able to:

1. Exhibit the ability to make proper repairs to longerons and formers.
2. Demonstrate the ability to make proper repairs on spars, ribs and bulkhead leading and trailing edges.
3. Explain the proper method of sealing repair areas.
4. Exhibit the ability to make proper repairs to ailerons, flaps, elevators, rudders, stabilizers and tabs.

BLOCK III - AIRCRAFT ASSEMBLY

The student must be able to:

1. Exhibit the ability to read and understand fuselage and wing station numbering systems.
2. Explain the proper methods of checking alignment of gear, wing, tail and fuselage after structure repairs.
3. Demonstrate the ability to assemble aircraft parts after repairs.

BLOCK IV - QUINMESTER POSTTEST

The student must be able to:

1. Satisfactorily complete the quinmester posttest.

Course Outline

SHEET METAL WORK 2 - 9855
(Aircraft Assembly, Riveting and Surface Repair 2)

Department 48 - Quin 9855.03

I. METAL FASTENERS

A. Riveting
1. Burring edges of metal
2. Drilling holes for rivets
a. Hand drills
b. Power drills
3. Burring drilled holes
4. Grinding drill bits

B. Installing Rivets
1. Driving rivets
a. By hand
b. With rivet gun
c. With squeeze riveter
2. Bucking rivets
3. Inspecting rivets
4. Removing and replacing rivets

II. GENERAL STRUCTURAL REPAIRS

A. Making Structural Repairs
1. Spars
2. Bulkhead
3. Ribs
4. Leading edges
5. Trailing edges
6. Longerons and formers
7. Sealing repair areas

B. Making Repairs to Flight Controls
1. Ailerons
2. Flaps
3. Stabilizers
4. Rudders
5. Elevators
6. Control tabs
7. Balancing surface control
8. Attaching support jigs and fixtures

III. AIRCRAFT ASSEMBLY

A. Checking Alignment of Structures

B. Reading Stations' Diagrams
1. Fuselage station numbering systems
2. Wing station numbering systems

C. Using Manufacturer's Manuals
   1. Procedure to measure angle of incidence, dihedral
   2. Checking alignment, gear, wing, tail

IV. QUINMESTER POSTTEST

BIBLIOGRAPHY
(Aircraft Assembly, Riveting and Surface Repair 2)

Basic References:

None

Supplementary References:

1. Airframe and Power Plant Mechanics - Airframe Handbook AC-65-15. F.A.A. Washington, D.C.: U.S. Government Printing Office, 1972. Pp. 538.

2. Airframe and Power Plant Mechanics - General Handbook AC-65-9. F.A.A. Washington, D.C.: U.S. Government Printing Office, 1970. Pp. 497.

3. Airframe Mechanics Written Exam Guide. Fort Worth, Texas: Acme School of Aeronautics, 1968. Pp. 63.

4. Bent, Ralph D., and McKinley, James L. Aircraft Maintenance and Repair. New York: McGraw-Hill Book Company, 1955. Pp. 444.

5. Federal Aviation Administration. Acceptable Methods, Techniques and Practices - Aircraft Alteration - Advisory Circular 43-13-2. Washington, D.C.: U.S. Government Printing Office, 1965. Pp. 74.

6. _____. Acceptable Methods, Techniques and Practices - Aircraft Inspection and Repair - Advisory Circular 43-13-1. Washington, D.C.: U.S. Government Printing Office, 1965. Pp. 232.

7. Giachino, J. W. Aircraft Sheet Metal Work. Peoria, Illinois: The Manual Arts Press, 1942. Pp. 123.

8. Leavell, Stuart, and Bunnay, Stanley. Standard Aircraft Handbook. Los Angeles: Aero Publishers, Inc., 1952. Pp. 159.

9. Nista, Albert H. Aircraft Riveting. New York: McGraw-Hill Book Co. Inc., 1946. Pp. 160.

10. Northrup Institute of Technology. Basic Science for Aerospace Vehicles. 3rd ed. New York: McGraw-Hill Book Company, 1963. Pp. 320.

11. Overby, Charles A. Aircraft and Missle Design Maintenance Handbook. New York: The MacMillan Company, 1960. Pp. 320.

12. United States Dept. of Air Force. Airframe Maintenance, Airforce Manual 52-11. Washington, D.C.: U.S. Government Printing Office, 1964. Pp. 314.

13. U.S. Naval Air Technical Training Command. Aircraft Structural Maintenance, Navpers 10308B. Washington, D.C.: U.S. Government Printing Office, 1969. Pp. 414.

Films:

1. Airplane Structures. 16 mm. 45 min. Black. Sound. Jan Handy.

2. Building PBY. 16 mm. 45 min. Black. Consolidated Aircraft Corporation.

3. How to Rivet Aluminium. 16 mm. 20 min. Black. Sound. Alcoa.

4. Forming Aluminium. 16 mm. 20 min. Black. Alcoa.

A P P E N D I X

Quinmester Posttest Sample

QUINMESTER POSTTEST

Name _____ Date _____ Score _____

Multiple Choice Test Items

Each statement needs a word, a figure, or a phrase to make it correct. Only one of the choices listed is correct. Place the letter of the choice you make in the space provided at the left edge of the sheet.

____ 1. In making repairs, you replace rivets with those of the same size and strength whenever possible. If the rivet hole becomes enlarged, you may:

a. Squeeze the rivet in a vise to enlarge shank, then install in the enlarged hole.
b. Drill the hole for the next larger rivet size making sure minimum edge distance and spacing are maintained.
c. Install the same size rivet as the rivet will swell and fill the hole.
d. Replace rivet with a larger aircraft bolt.

____ 2. The type of material that the rivet is made of is identified by:

a. Diameter of rivet
b. Type of rivet head
c. Mark on rivet head
d. Color of material

____ 3. To retain 83% of the material's tensile strength, the rivet spacing should be:

a. At least 1/2 inch spacing for all rivets
b. Four times the diameter of the rivet
c. Two times the diameter of the rivet
d. Three times the diameter of the rivet

____ 4. Rivet holes are usually drilled larger than the rivets. This is usually around:

a. .001 inch
b. .003 inch
c. .02 inch
d. .008 inch

____ 5. If you were going to rivet through two pieces of metal whose combined thickness was .064 inch, the shank of the rivet should be:

a. .064 plus 1 1/2 times diameter of the rivet
b. 1 1/2 times the diameter of the rivet
c. 1 1/2 times .064
d. .064 plus twice the diameter of the rivet

____ 6. If you had some 2017D rivets that had been aging for two hours after quenching:

a. You could use them providing they had not exceeded four hours of aging
b. You could not use them because 175 rivets should be used within one hour after quenching
c. You could use them providing they had rot exceeded two hours of aging
d. You could not use them because 2017D rivets should be used within 30 minutes after quenching.

____ 7. When riveting two sheets of aluminium together and one is thicker than the other, the formed head of the rivet should:

a. Go on the side of the thinnest sheet
b. Go on the side of the thickest sheet
c. It makes no difference which side the pre-formed head goes on
d. Go on either side, if the paper tools are being used to buck the rivet.

____ 8. Aluminium alloy rivets 25 (1100) should never be used on structural members of aircraft:

a. Because they become brittle with age
b. They are too soft
c. They are two hard to drive and might damage the structural
d. Because they can only be used in shear

____ 9. To make a splice plate, riveting a piece of .080 aluminium stock to .040 skin with 1/8 rivets, the length of the rivets would be:

a. 1/8"
b. 1/4"
c. 5/16"
d. 3/8"

____10. A properly installed rivet is designed to withstand which of the following stresses?

a. Shear
b. Compression
c. Tension
d. Torsion

____11. When an aircraft fuselage is damaged, and a noticeable twist or distortion is apparent, the final step taken to repair this is to:

a. Use a "port-a-power" to bring bulkheads back into place.
b. Remove the damaged section and replaced with factory approved parts
c. Place the fuselage in a factory approved "jig" and then proceed with the repair
d. Cut out all damage area immediately

___12. If you plan to use 1/8 inch rivets on a metal surface patch with a single row pattern, what will be the minimum overlap of the metal?

a. 7/8 inch
b. 1 inch
c. 1/2 inch
d. 3/4 inch

___13. If a bulge is found between two riveted sheets, the most probable cause is that:

a. The rivets have been overdriven
b. The rivets are too long
c. The rivets are age hardened and not heat treated prior to use
d. The sheets were not held together properly during the riveting operation.

___14. Members should be carefully examined for the presence of sharp nicks and deep scratches which may have resulted from service. Care must be taken to smooth out all of these found in order to:

a. Remove stress concentrations that may cause failure
b. Keep the metal from corroding at these spots
c. Enable the part to pass inspection
d. Prevent the member from splitting

___15. When repairing control surface, especially on high performance aircraft, care should be exercised that the repairs do not involve the addition of weight aft of the hinge line. Such procedure may:

a. Induce flutter of the control surface
b. Adversely disturb the static balance of the control surface
c. Adversely disturb the dynamic balance of the control surface
d. All of the above are correct

___16. Which of the following is true concerning control surface movement?

a. Movement is measured in inches or degrees
b. Specification can be found in the type certificate data sheet or aircraft specification
c. They have positive stops
d. All of the above are correct

___17. The use of self-tapping screws in aircraft primary structural assemblies is:

a. A common practice
b. Forbidden
c. Recommended in blind areas, with two threads showing
d. Allowed on aircraft with never excess speed less than 150 mph

____18. What is the effect on a high-shear rivet that is under-bucked?

a. It will be loose in the hole
b. The same as on a hollow shank rivet
c. The collar will not be properly seated
d. Its shear strength will be reduced

____19. Semi-monocoque fuselage consists of vertical members covered with a structural skin. The longitudinal members are called:

a. Frames
b. Stringers
c. Bulkheads
d. Formers

____20. Spars also called beams are:

a. Principal chord structural members
b. Main spanwise members of the wing, stabilizers and other airfoils
c. Oval shape members of the fuselage
d. Front section of a wing, stabilizer or other airfoils

____21. Ribs are the principle:

a. Chordwise structural members
b. Main spanwise members
c. Main vertical members
d. All of the above

____22. The internal structure of the semi-monocoque fuselage is made up of longitudinal members called:

a. Longerons & stringers
b. Formers
c. Bulkheads & rings
d. All of the above

____23. Lightening holes are sometime cut in an aircraft's structural parts to:

a. Reduce weight
b. Increase lift
c. Decrease drag
d. Increase flexibility

____24. Trailing edges of an airfoil are:

a. Structural members
b. Non-structural members
c. Only two per aircraft
d. None of the above is correct

___25. When repairs on a control surface add weight fore or aft of the hinge center line, the control surface must be:

a. Painted to identify repair section
b. Never installed without the approval of the inspector
c. Rebalanced
d. Properly rerig and then install

ANSWER KEY TO QUIN'ESTER POSTTEST

Multiple Choice Test Items

1. b
2. c
3. d
4. c
5. a
6. d
7. b
8. b
9. c
10. a
11. c
12. c
13. d
14. a
15. d
16. d
17. b
18. c
19. b
20. b
21. a
22. d
23. a
24. b
25. c